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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/044,451	01/11/2002	Peter W. Richards	P46-US	8440

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SUNNYVALE, CA 94085

EXAMINER

TRAN, TRANG U

ART UNIT	PAPER NUMBER
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2614

DATE MAILED: 08/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/044,451	<b>Applicant(s)</b> RICHARDS ET AL.	
	<b>Examiner</b> Trang U. Tran	<b>Art Unit</b> 2614	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-60 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17, 19-52 and 54-60 is/are rejected.
- 7) ☒ Claim(s) 18 and 53 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3, 6, 10, 13-17, 19-26 and 28-34 are rejected under 35 U.S.C. 102(b) as being anticipate by Cosentino (US Patent No. 5,103,301).

In considering claim 1, Cosentino discloses all the claimed subject matter, note 1) the claimed a color wheel comprising at least one segment that occupies, for a given radius, a percentage of the circumference of the wheel at that radius, which percentage varies continuously or in multiple steps from a radially inward point to a radially outer point on the wheel is met by the color filter wheel 13 which contains several sets of three monochromatic filter sectors 13a in red, 13b in blue and 13c in green, all of equal area and percentage varies continuously from a radially inward point to a radially outer point on the wheel (Figs. 1-2 and 6, col. 7, lines 1-30 and col. 11, lines 49-62).

In considering claim 2, the claimed wherein the color wheel further comprises colored segments which comprise one red, one green and one blue segment is met by the color filter wheel 13 which contains several sets of three monochromatic filter sectors 13a in red, 13b in blue and 13c in green, all of equal area (Figs. 1-2 and 6, col. 7, lines 1-30 and col. 11, lines 49-62).

In considering claim 3, the claimed wherein the at least one segment is a white segment is met by the color filter wheel 13 which removes the blue filters and leaving the openings 413b clear, (Fig. 6) allows all the components of white light to pass through (Fig. 6, col. 11, lines 49-62).

In considering claim 6, the claimed wherein the at least one segment comprises a transparent or translucent material or no material within that segment of the wheel is met by the color filter wheel 13 which removes the blue filters and leaving the openings 413b clear, (Fig. 6) allows all the components of white light to pass through (Fig. 6, col. 11, lines 49-62).

In considering claim 10, the claimed further comprising at least three different filter segments in addition to the at least one segment is met by the color filter wheel 13 which has the nine filter sectors disposed circumferentially in the order R, B, G, R, B, G, R, B and G (Fig. 2, col. 7, lines 1-30 and col. 11, lines 49-62).

In considering claim 13, the claimed wherein the at least one segment is at least three segments having a different luminosity and color saturation than an adjacent one of said at least three different filter segments is met by the three clear segment 413b (Fig. 6, col. 11, lines 49-62).

In considering claim 14, the claimed wherein the at least three segments have a higher luminosity than the at last three different filter segments is met by the three clear segment 413b (Fig. 6, col. 11, lines 49-62).

In considering claim 15, the claimed wherein the at least three segments are interspersed between the at least three different filter segments is met by the three clear

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segment 413b which are interspersed between the three red segments 413A and the green segments 413C (Fig. 6, col. 11, lines 49-62).

In considering claim 16, the claimed wherein the at least three segments are white or yellow segments is met by the three clear segment 413b (white) (Fig. 6, col. 11, lines 49-62).

In considering claim 17, the claimed wherein the percentage increases from a radial inward point to a radial outer point is met by the color filter wheel 13 which has the percentage increases from a radial inward point to a radial outer point (Figs. 2 and 6, col. 7, lines 1-30 and col. 11, lines 49-62).

In considering claim 19, the claimed wherein the percentage increases continuously for the width of the at least one segment in the radial direction of the wheel is met by the color filter wheel 13 which has the percentage increases continuously for the width from a radial inward point to a radial outer point (Figs. 2 and 6, col. 7, lines 1-30 and col. 11, lines 49-62).

In considering claim 20, Cosentino discloses all the claimed subject matter, note 1) the claimed a color wheel having a plurality of filter segments adjacent each other around the circumference of the wheel, wherein at least one of the transitions from one filter segment to the next is curved or stepped is met by the color filter wheel 13 which contains several sets of three monochromatic filter sectors 13a in red, 13b in blue and 13c in green, all of equal area and the transitions from one filter segment to the next is curved (Figs. 1-2 and 6, col. 7, lines 1-30 and col. 11, lines 49-62).

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In considering claim 21, the claimed wherein the plurality of filter segments comprise at least three color segments and at least one white segment is met by the color filter wheel 13 which removes the blue filters and leaving the openings 413b clear, (Fig. 6) allows all the components of white light to pass through, the three red lights through three filters 413a and the three green lights through three filters 413c (Fig. 6, col. 11, lines 49-62).

In considering claim 22, the claimed wherein the at least three color segments comprise red, green and blue is met by the color filter wheel 13 which contains several sets of three monochromatic filter sectors 13a in red, 13b in blue and 13c in green, all of equal area (Figs. 1-2 and 6, col. 7, lines 1-30 and col. 11, lines 49-62).

In considering claim 23, the claimed wherein the plurality of filter segments comprise at least three color segments and at least one segment for providing white, yellow or orange light is met by the color filter wheel 13 which removes the blue filters and leaving the openings 413b clear, (Fig. 6) allows all the components of white light to pass through, the three red lights through three filters 413a and the three green lights through three filters 413c (Fig. 6, col. 11, lines 49-62).

In considering claim 24, the claimed wherein one or more of the filter segments comprises an edge defining a transition to an adjacent filter segment that does not lie on radius of the wheel is met by the color filter wheel 13 which has edge defining a transition to an adjacent filter segment that does not lie on radius of the wheel (curved line) (Figs. 1-2 and 6, col. 7, lines 1-30 and col. 11, lines 49-62).

In considering claim 25, the claimed wherein the at least one segment for providing white, yellow or orange light comprises edges facing adjacent filter segments that are curved or stepped is met by the color filter wheel 13 which removes the blue filters and leaving the openings 413b clear, (Fig. 6) allows all the components of white light to pass through and the clear segment 413b which has edges facing adjacent filter segments that are curved (Fig. 6, col. 11, lines 49-62).

In considering claim 26, the claimed wherein the at least one segment for providing white, yellow or orange light comprises at least three white segments disposed between color segments is met by the three clear segment 413b (Fig. 6, col. 11, lines 49-62).

In considering claim 28, Cosentino discloses all the claimed subject matter, note 1) the claimed a color wheel having a plurality of filter segments adjacent each other around the circumference of the wheel, wherein at least one of the segments is a higher brightness segment than the others and has sides facing adjacent filter segments that do not lie on the radius of the wheel is met by the color filter wheel 13 which removes the blue filters and leaving the openings 413b clear, (Fig. 6) allows all the components of white light to pass through and has sides facing adjacent filter segments that do not lie on the radius of the wheel (curved) (Figs. 1-2 and 6, col. 7, lines 1-30 and col. 11, lines 49-62).

Claims 29-34 are rejected for the same reason as discussed in claims 21-26, respectively.

***Claim Rejections - 35 USC § 103***



3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Cosentino (US Patent No. 5,103,301) in view of Guerinot et al (US Patent No. 6,147,720).

In considering claim 4, Cosentino discloses all the limitations of the instant invention as discussed in claim 1 above, except for providing the claimed wherein the colored segments further comprise a yellow, cyan and/or magenta segment. Guerinot et al teach that if the projection system is a color sequential system, the rotating annular portion 20 of wheel W that is alternately used in transmission and in reflection can be a color filter wheel as show in Fig. 2B, when seen in transmission, the filters are, for example, in the order: red, green, blue, cyan, magenta and yellow (Figs. 2B-2D, col. 4, line 40 to col. 5, line 55). Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention to incorporate the colored segments further comprise a yellow, cyan and/or magenta segment as taught by Guerinot et al into Cosentino's system in order to allow the light from two lamps to be efficiently multiplexed onto a single light valve, thereby substantially doubling the system brightness (col. 1, lines 45-48 of Guerinot et al).

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Cosentino (US Patent No. 5,103,301) in view of Kunzman (US Patent No. 6,392,717 B1).

In considering claim 5, Cosentino discloses all the limitations of the instant invention as discussed in claim 1 above, except for providing the claimed wherein the at least one segment is a clear glass or polymer. Kunzman teaches that the system of claim 2, wherein the clear segment is clear glass (col. 12, lines 25-28). Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention to incorporate the clear glass as taught by Kunzman into Cosentino's system since it merely amount of selecting available components.

6. Claims 7-9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Cosentino (US Patent No. 5,103,301) in view of Poradish et al (US Patent No. 5,650,832).

In considering claim 7, Cosentino discloses all the limitations of the instant invention as discussed in claim 1 above, except for providing the claimed wherein the at least one segment does not extend completely across the width of the color wheel in the radial direction of the wheel. Poradish et al teach that Fig. 4 illustrates a color wheel 15', which is also transversely moveable, but has concentric rings 41 and 43 of different filters, a first filter ring 41 is comprised of filters having one set of color saturation values, the resulting colors are R, G, and B, a second filter ring 43 has filters with one or more different color saturation values and the R and B colors of filter ring 41 do not extend completely across the width of the color wheel in the radial direction of the wheel

(Fig. 4, col. 5, line 50 to col. 6, line 10). Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention to incorporate the different color filter ring as taught by Poradish et al into Cosentino's system in order to provide different color saturation levels for an images (col. 1, lines 53-55 of Poradish et al).

In considering claim 8, Cosentino discloses all the limitations of the instant invention as discussed in claim 1 above, except for providing the claimed wherein the at least one segment provides higher brightness for each frame when the wheel is rotated in a projection system. Poradish et al teach that Fig. 4 illustrates a color wheel 15', which is also transversely moveable, but has concentric rings 41 and 43 of different filters, a first filter ring 41 is comprised of filters having one set of color saturation values, the resulting colors are R, G, and B, a second filter ring 43 has filters with one or more different color saturation values...and **like color wheel 15, color wheel 15' provides a choice of more saturated colors with less intensity or less saturated color that are brighter** (Fig. 4, col. 5, line 50 to col. 6, line 10). Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention to incorporate the different color filter ring as taught by Poradish et al into Cosentino's system in order to permit the selection of a desired balance between color saturation and brightness for a particular image (col. 2, lines 7-11 of Poradish et al).

In considering claim 9, Cosentino discloses all the limitations of the instant invention as discussed in claim 1 above, except for providing the claimed wherein the at least one segment provides increased color saturation for each frame when the wheel is rotated in a projection system. Poradish et al teach that Fig. 4 illustrates a color wheel

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15', which is also transversely moveable, but has concentric rings 41 and 43 of different filters, a first filter ring 41 is comprised of filters having one set of color saturation values, the resulting colors are R, G, and B, a second filter ring 43 has filters with one or more different color saturation values ...and **like color wheel 15, color wheel 15' provides a choice of more saturated colors with less intensity or less saturated color that are brighter** (Fig. 4, col. 5, line 50 to col. 6, line 10). Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention to incorporate the different color filter ring as taught by Poradish et al into Cosentino's system in order to permit the selection of a desired balance between color saturation and brightness for a particular image (col. 2, lines 7-11 of Poradish et al).

In considering claim 11, Cosentino discloses all the limitations of the instant invention as discussed in claim 1 above, except for providing the claimed wherein the at least three different filter segments occupy, for a given radius, a percentage of the circumference of the wheel at that radius, which percentage remains the same from a radially inward point to a radially outer point on the wheel. Poradish et al teach that a typical size of color wheel 15 is approximately 4 inches in diameter for incident light having a spot size of 4-6 millimeters and a percentage of the circumference of the wheel at the radius, which percentage remains the same from a radially inward point to a radially outer point on the wheel (Fig. 2, col. 4, lines 1-25). Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention to incorporate the color wheel as taught by Poradish et al into Cosentino's system in order to provide the display system that uses a color wheel for sequential color displays.

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Cosentino (US Patent No. 5,103,301) in view of Sato (US Patent No. 6,467,910 B1).

In considering claim 12, Cosentino discloses all the limitations of the instant invention as discussed in claim 1 above, except for providing the claimed wherein light passing through the at least three different filter segments is centered around a different wavelength for each segment. Sato teaches that the three or four R, G, B (W) effective light beams L12 having wavelength bands shifted by time are reflected toward the second mirror 14 by the reflection type color wheel 17 (Fig. 1, col. 6, line 64 to col. 7, line 51). Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention to incorporate the different wavelength for each segment (shift by time) as taught by Sato into Cosentino's system in order to freely set the reflection type color wheel to any desired angle other than a right angle with respect to an optical axis of white light emitted from the light source and to make the diameter of the reflection type color wheel larger without increasing the overall height of the apparatus (col. 4, lines 48-53 of Sato).

8. Claims 27 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Cosentino (US Patent No. 5,103,301) in view of Kunzman (US Patent No. 6,536,904 B2).

In considering claim 27, Cosentino discloses all the claimed subject matter, note 1) the claimed wherein one of the at least three color segments has edges abutting adjacent filter segments that do not lie along the radius of the color wheel is met by the color filter wheel 13 in which the red segment or green segment or blue segment has

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sides facing adjacent filter segments that do not lie on the radius of the wheel (curved) (Figs. 1-2 and 6, col. 7, lines 1-30 and col. 11, lines 49-62). However, Cosentino explicitly does not disclose the claimed wherein one of the at least three color segments is not disposed adjacent the at least one white segment. Kunzman teaches that sequential systems sometimes add a white (clear) segment to the color wheel 20, as show in Fig. 2a, and the green (G) segment is not disposed adjacent the at least one white segment (Fig. 2a, col. 1, lines 37-51). Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention to incorporate the green (G) segment is not disposed adjacent the at least one white segment as taught by Kunzman into Cosentino's system in order to display some portion of the luminance signal during the white segment time to provide the brighter picture on the display (col. 1, lines 37-51 of Kunzman).

Claim 35 is rejected for the same reason as discussed in claim 27 above.

9. Claims 36-41, 45, 48-52, 54, 56 and 58-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kunzman (US Patent No. 6,392,717 B1) in view of Cosentino (US Patent No. 5,103,301).

In considering claim 36, Kunzman discloses all the claimed subject matter, note 1) the claimed a projection system (Fig. 1) comprising: a light source is met by the lamp 14 (Fig. 1, col. 3, lines 30-40), 2) the claimed the color wheel is met by the color wheel 18 (Fig. 1, col. 3, lines 30-65), 3) the claimed a spatial light modulator is met by the spatial light modulator (SLM) 28 (Fig. 1, col. 3, lines 30-65), and 4) the claimed projection optics is met by the projection optics 30 (Fig. 1, col. 3, lines 30-65).

However, explicitly does not disclose the claimed the color wheel of claim 1.

Cosentino teaches that the color filter wheel 13 which contains several sets of three monochromatic filter sectors 13a in red, 13b in blue and 13c in green, all of equal area and percentage varies continuously from a radially inward point to a radially outer point on the wheel (Figs. 1-2 and 6, col. 7, lines 1-30 and col. 11, lines 49-62).

Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention to incorporate the color wheel as taught by Cosentino into Kunzman's system in order to tailor the color filters to the individual system, making the color efficiencies higher, thereby producing better image.

In considering claim 37, the claimed wherein the color wheel further comprises colored segments which comprise one red, one green and one blue segment is met by the color filter wheel 13 which contains several sets of three monochromatic filter sectors 13a in red, 13b in blue and 13c in green, all of equal area (Figs. 1-2 and 6, col. 7, lines 1-30 and col. 11, lines 49-62 of Cosentino).

In considering claim 38, the claimed wherein the at least one segment is a white segment is met by the color filter wheel 13 which removes the blue filters and leaving the openings 413b clear, (Fig. 6) allows all the components of white light to pass through (Fig. 6, col. 11, lines 49-62 of Cosentino).

In considering claim 40, the claimed wherein the at least one segment is a clear glass or polymer is met by the color filter wheel of the system of claim 2, wherein the clear segment is clear glass (col. 12, lines 25-28 of Kunzman).

In considering claim 41, the claimed wherein the at least one segment comprises a transparent or translucent material or no material within that segment of the wheel is met by the color filter wheel 13 which removes the blue filters and leaving the openings 413b clear, (Fig. 6) allows all the components of white light to pass through (Fig. 6, col. 11, lines 49-62 of Cosentino).

In considering claim 45, the claimed further comprising at least three different filter segments in addition to the at least one segment is met by the color filter wheel 13 which has the nine filter sectors disposed circumferentially in the order R, B, G, R, B, G, R, B and G (Fig. 2, col. 7, lines 1-30 and col. 11, lines 49-62 of Cosentino).

In considering claim 48, the claimed wherein the at least one segment is at least three segments having a different luminosity and color saturation than an adjacent one of said at least three different filter segments is met by the three clear segment 413b (Fig. 6, col. 11, lines 49-62 of Cosentino).

In considering claim 49, the claimed wherein the at least three segments have a higher luminosity than the at last three different filter segments is met by the three clear segment 413b (Fig. 6, col. 11, lines 49-62 of Cosentino).

In considering claim 50, the claimed wherein the at least three segments are interspersed between the at least three different filter segments is met by the three clear segment 413b which are interspersed between the three red segments 413A and the green segments 413C (Fig. 6, col. 11, lines 49-62 of Cosentino).



In considering claim 51, the claimed wherein the at least three segments are white or yellow segments is met by the three clear segment 413b (white) (Fig. 6, col. 11, lines 49-62 of Cosentino).

In considering claim 52, the claimed wherein the percentage increases from a radial inward point to a radial outer point is met by the color filter wheel 13 which has the percentage increases from a radial inward point to a radial outer point (Figs. 2 and 6, col. 7, lines 1-30 and col. 11, lines 49-62 of Cosentino).

In considering claim 54, the claimed wherein the percentage increases continuously for the width of the at least one segment in the radial direction of the wheel is met by the color filter wheel 13 which has the percentage increases continuously for the width from a radial inward point to a radial outer point (Figs. 2 and 6, col. 7, lines 1-30 and col. 11, lines 49-62 of Cosentino).

In considering claim 56, the claimed wherein the light source is a white light source is met by the lamp 14 that is a white light source (Fig. 1, col. 3, lines 30-49).

In considering claim 58, the claimed wherein the projection system further comprises a target is met by the projector display device (CRT) (Fig. 1).

In considering claim 59, the claimed wherein the projection system is a front or rear screen television or computer monitor is met by the projector display device (CRT) (Fig. 1).

10. Claims 42-44, 46, 55 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kunzman (US Patent No. 6,392,717 B1), in view of Cosentino (US

Patent No. 5,103,301), as applied in claim 36 above, and further in view of Poradish et al (US Patent No. 5,650,832).

In considering claim 42, the combination of Kunzman and Cosentino discloses all the limitations of the instant invention as discussed in claim 36 above, except for providing the claimed wherein the at least one segment does not extend completely across the width of the color wheel in the radial direction of the wheel. Poradish et al teach that Fig. 4 illustrates a color wheel 15', which is also transversely moveable, but has concentric rings 41 and 43 of different filters, a first filter ring 41 is comprised of filters having one set of color saturation values, the resulting colors are R, G, and B, a second filter ring 43 has filters with one or more different color saturation values and the R and B colors of filter ring 41 do not extend completely across the width of the color wheel in the radial direction of the wheel (Fig. 4, col. 5, line 50 to col. 6, line 10). Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention to incorporate the different color filter ring as taught by Poradish et al into the combination of Kunzman and Cosentino's system in order to provide different color saturation levels for an images (col. 1, lines 53-55 of Poradish et al).

In considering claim 43, the combination of Kunzman and Cosentino discloses all the limitations of the instant invention as discussed in claim 36 above, except for providing the claimed wherein the at least one segment provides higher brightness for each frame when the wheel is rotated in a projection system. Poradish et al teach that Fig. 4 illustrates a color wheel 15', which is also transversely moveable, but has concentric rings 41 and 43 of different filters, a first filter ring 41 is comprised of filters

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having one set of color saturation values, the resulting colors are R, G, and B, a second filter ring 43 has filters with one or more different color saturation values...and **like color wheel 15, color wheel 15' provides a choice of more saturated colors with less intensity or less saturated color that are brighter** (Fig. 4, col. 5, line 50 to col. 6, line 10). Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention to incorporate the different color filter ring as taught by Poradish et al into the combination of Kunzman and Cosentino's system in order to permit the selection of a desired balance between color saturation and brightness for a particular image (col. 2, lines 7-11 of Poradish et al).

In considering claim 44, the combination of Kunzman and Cosentino discloses all the limitations of the instant invention as discussed in claim 36 above, except for providing the claimed wherein the at least one segment provides increased color saturation for each frame when the wheel is rotated in a projection system. Poradish et al teach that Fig. 4 illustrates a color wheel 15', which is also transversely moveable, but has concentric rings 41 and 43 of different filters, a first filter ring 41 is comprised of filters having one set of color saturation values, the resulting colors are R, G, and B, a second filter ring 43 has filters with one or more different color saturation values ...and **like color wheel 15, color wheel 15' provides a choice of more saturated colors with less intensity or less saturated color that are brighter** (Fig. 4, col. 5, line 50 to col. 6, line 10). Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention to incorporate the different color filter ring as taught by Poradish et al into the combination of Kunzman and Cosentino's system in order to

permit the selection of a desired balance between color saturation and brightness for a particular image (col. 2, lines 7-11 of Poradish et al).

In considering claim 46, Cosentino discloses all the limitations of the instant invention as discussed in claims 36 and 45 above, except for providing the claimed wherein the at least three different filter segments occupy, for a given radius, a percentage of the circumference of the wheel at that radius, which percentage remains the same from a radially inward point to a radially outer point on the wheel. Poradish et al teach that a typical size of color wheel 15 is approximately 4 inches in diameter for incident light having a spot size of 4-6 millimeters and a percentage of the circumference of the wheel at the radius, which percentage remains the same from a radially inward point to a radially outer point on the wheel (Fig. 2, col. 4, lines 1-25). Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention to incorporate the color wheel as taught by Poradish et al into Cosentino's system in order to provide the display system that uses a color wheel for sequential color displays.

In considering claim 55, the combination of Kunzman and Cosentino discloses all the limitations of the instant invention as discussed in claim 36 above, except for providing the claimed the claimed wherein the spatial light modulator is a Micro mirror array. Poradish et al teach that the SLM 14 may be any type of SLM, for purposes of example, this description is in terms of a display system whose SLM 14 is a digital micro-mirror device (DMD) (Fig. 1, col. 3, lines 56-67). Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention to incorporate the

digital micro mirror array (DMD) as taught by Poradish et al's system in order to provide high resolution without the bulk of CRT systems (col. 1, lines 10-13 of Poradish et al).

In considering claim 60, the combination of Kunzman and Cosentino discloses all the limitations of the instant invention as discussed in claim 36 above, except for providing the claimed further comprising a housing and a knob or button for mechanically moving the color wheel so as to increase or decrease brightness.

Poradish et al teach that in the example of Fig. 3, the transverse motion is afforded to the color wheel assembly by placing motor 15a on a track 31, it can be moved along this track 31 and once a desired position is obtained, locked into place for operation, the position of the wheel 15, whether it is moved with only shaft 15b or with the entire color wheel assembly, **can be by manual operation**, or in more complex embodiments, could be automatic (Fig. 3, col. 5, lines 40-49). Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention to incorporate the manual operation (could be a knob or button) as taught by Poradish et al into the combination of Kunzman and Cosentino's system in order to provide the manual operation for adjusting the brightness of the particular image (col. 2, lines 5-10 of Poradish et al).

11. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kunzman (US Patent No. 6,392,717 B1) in view of Cosentino (US Patent No. 5,103,301), as applied in claim 36 above, and further in view of Sato (US Patent No. 6,467,910 B1).

In considering claim 47, the combination of Kunzman and Cosentino discloses all the limitations of the instant invention as discussed in claims 36 and 45 above, except

for providing the claimed wherein light passing through the at least three different filter segments is centered around a different wavelength for each segment. Sato teaches that the three or four R, G, B (W) effective light beams L12 having wavelength bands shifted by time are reflected toward the second mirror 14 by the reflection type color wheel 17 (Fig. 1, col. 6, line 64 to col. 7, line 51). Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention to incorporate the different wavelength for each segment (shift by time) as taught by Sato into the combination of Kunzman and Cosentino's system in order to freely set the reflection type color wheel to any desired angle other than a right angle with respect to an optical axis of white light emitted from the light source and to make the diameter of the reflection type color wheel larger without increasing the overall height of the apparatus (col. 4, lines 48-53 of Sato).

12. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kunzman (US Patent No. 6,392,717 B1) in view of Cosentino (US Patent No. 5,103,301), as applied in claims 36 and 56 above, and further in view of Guerinot et al (US Patent No. 6,147,720).

In considering claim 57, the combination of Kunzman and Cosentino discloses all the limitations of the instant invention as discussed in claims 36 and 56 above, except for providing the claimed wherein the white light source is a halogen lamp, a xenon arc lamp, a UHP arc lamp or a white light laser. Guerinot et al teach that one suitable lamp from the point of view of long life and high lumens per watt is the 100 W UHP lamp available from Philips Lighting, or similar lamps available from other manufacturers (col. 1, lines 20-31). Therefore, it would have been obvious to one

ordinary skill in the art at the time of the invention to incorporate the UHP lamp as taught by Guerinot et al into the combination of Kunzman and Cosentino's system since it merely amount of selecting available lamps.

***Allowable Subject Matter***

13. Claims 18 and 53 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Dewald et al. (US Patent No. 6,771,325 B1) disclose color recapture for display systems.

Lee (US Patent No. 6,520,644 B1) discloses cylindrical color wheel and fabricating method thereof and projector using the same.

Edlinger et al. (US Patent No. 6,024,453) disclose method of rapidly producing color changes in an optical light path.

Doany et al. (US Patent No. 5,921,650) disclose high efficiency field-sequential color projector using two SLMS.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Trang U. Tran whose telephone number is (703) 305-0090. The examiner can normally be reached on 8:00 AM - 5:30 PM, Monday to Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John W. Miller can be reached on (703) 305-4795. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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TT  
July 29, 2004

  
TRANG TRAN  
PATENT EXAMINER